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10 December 1980

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 74

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PAKISTANI, INDIAN NUCLEAR PROGRAMS COMPARED

New Delhi PATRIOT in English 4 Nov 80 p 2

[Article by K. Subrahmanyam, director, Institute for Defense Studies and Analyses, New Delhi: "Pakistan's Nuclear Effort"]

[Text]

PRIME Minister Indira Gandhi said in the Rajya Sabha on 7 August, 1980, that India had information about the Pakistani desire to make an atom bomb. The Minister for External Affairs, Mr P V Narasimha Rao, in a New York interview to the 'Foreign Policy' magazine, reiterated that the Government of India had information that Pakistan was making the bomb. In April 1979 the US Administration cut off its economic aid to Pakistan under the Symington Amendment on the ground that Pakistan was engaged in a military nuclear programme. Now the Soviet newspaper Pravda has come out with an account about Pakistani nuclear efforts and, according to this, the programme would give Pakistan a capability to produce two to three bombs a year.

Mass media of many Western countries have given detailed accounts of how Pakistan managed to evade the barriers erected by the London Suppliers' Club (a group of prominent industrial countries of both Eastern and Western blocs manufacturing nuclear equipment for peaceful and warlike purposes) and import various sensitive equipment and technologies.

A Dutch Parliamentary Committee has published a report about the Pakistani scientist Dr A Q Khan's activities during his stay in the Uranium Centrifuge Plant at Almelo in the Netherlands. Yet the Pakistani President, General Ziaul Haq, asserts that the Pakistan nuclear programme is a peaceful one.

In a recent interview, President Zia characterised all the above as propaganda by Israel and Western powers and Pakistan's neighbour (meaning India). He admitted that Pakistan was embarked upon uranium enrichment, but maintained that it was meant entirely for peaceful application of nuclear technology.

While a serious Pakistani military nuclear effort will have significant security implications for India, it is also not in India's interests to have a Third World country's peaceful nuclear efforts unnecessarily maligned. India's peaceful nuclear explosion (PNE) too had a problem of credibility for some period of time and only after a lapse of a few years has the world come to accept that India has not built, and is not building, a nuclear arsenal.

Pakistan's nuclear effort poses greater problems in regard to credibility than India's did and at least to quite some extent the problem is one of Pakistan's own creation. Since 1965 India had been arguing in various world forums that peaceful nuclear explosions (PNE) were to be differentiated from nuclear weapon tests and, while India had no intention of developing nuclear weapons, it reserved the right to develop the technology of PNEs.

During the fifties and sixties, both the US and the USSR had conducted several PNEs apart from the weapon tests. At that stage, Brazil and Argentina supported the Indian thesis while Pakistan agreed with view of the nuclear weapon states that, since technology-wise there was no difference between the nuclear weapon tests and the PNEs, non-nuclear weapon states should not undertake PNEs.

In 1974 Pakistan virulently denounced the Indian PNE. Since then Pakistan has not come out with any statement whether it accepts the PNEs and if so how, why and when it got converted to the philosophy of the PNE.

It is also not quite clear how uranium enrichment fits in with Pakistan's programme of peaceful nuclear development. There are three categories of nuclear reactors for production of power in the world and they use natural uranium, enriched uranium and plutonium as fuel. Pakistan's only power reactor KANUPP, commissioned with Canadian assistance, uses only natural uranium as fuel and Pakistan, unlike India at Tarapur, has no power reactor requiring enriched uranium fuel. Pakistan is not known to be doing any research and development work either on reactors requiring enriched uranium or on fast breeder reactors requiring plutonium as fuel.

India has an established Reactor Research Centre at Kalpakkam in Madras and is attempting to set up a fast breeder reactor requiring plutonium fuel. India is also experimenting with mixed oxide fuel (a mixture of plutonium and natural uranium oxides) to run the Tarapur reactor in case the enriched uranium fuel supply is stopped by the United States. Therefore, India needs the plutonium reprocessing technology to extract plutonium from the irradiated uranium fuel rods.

Pakistan at one time announced grand plans of setting up one reactor every alternate year to meet its power needs of the future. Perhaps there is a good case for such a programme in that country as it does not have enough oil or coal resources. But the problem today is that, with the formation of the London Suppliers' Group and their insistence on full-scope safeguards before selling reactors, there is no chance of Pakistan being in a position to push through a programme of setting up a number of nuclear reactors unless Pakistan accepts the full-scope safeguards.

It is known that Pakistan is attempting to put up a comprehensive nuclear complex at Chasma barrage. While civil works are going on for a power reactor, there is no definite information about either the type of reactor chosen or the contractor for it. It is believed that a pressurised water enriched uranium reactor is being favoured. But Pakistan has no industrial base or know-how to design, develop and set up its own power reactor. Under the regulations of the London Suppliers' Group, Pakistan is not likely to get a reactor by transfer of technology. Therefore, the question arises: what does it need the enriched uranium for?

Similarly mystifying is Pakistan's quest for plutonium reprocessing technology. The only peaceful use of plutonium is as fuel in a fast breeder reactor or to mix it with uranium oxide for fuel in an enriched uranium reactor. Pakistan has neither of the two types of reactors. Pakistani authorities have not so far explained what is the peaceful use they have in mind for plutonium.

But the most difficult to explain in the Pakistani nuclear programme is the fact that, according to widely disseminated information in the Western media, which has not been rebutted by Pakistan, the uranium enrichment project under the leadership of Dr A Q Khan, being set up at Kahuta near Rawalpindi is not part of the activities of the Pakistani Atomic Energy Commission. It is a special project under the Pakistan Ministry of Defence headed by an engineer, Anis Syed, and it is modelled somewhat on the wartime American atomic bomb development project—the Manhattan.

In India, the PNE work was handled entirely by scientists of the Bhabha Atomic Research Centre as part of their research programme and they conducted the test.

Lastly, the person who was in charge of the Pakistan atomic energy programme for thirteen crucial years, and who initiated the projects for uranium enrichment and plutonium reprocessing, Zulfiqar Ali Bhutto, in his death cell testament, made no secret of the purpose underlying these efforts. He considered his efforts in the support of the nuclear programme as his greatest contribution to Pakistan and his dream was to give Pakistan the Islamic bomb.

President Ziaul Haq will be credible if he or his top advisers spell out the Pakistani nuclear strategy, the roles of their plutonium reprocessing and uranium enrichment programmes in that strategy, and why some parts of their programme are in the defence sector. Till then the world will draw its own logical inferences and hesitate to accept him at his word. —PTI Feature.

CSO: 5100

MINISTER EYES NUCLEAR DEVELOPMENT IN NORTH

Canberra THE AUSTRALIAN in English 22 Oct 80 p 11

[Article by Buzz Kennedy]

[Excerpt] Why doesn't the Northern Territory go nuclear?

In power generation, that is: it has 25 per cent of the world's proven reserves of accessible uranium but not enough power for development and maybe the most expensive electricity in Australia--entirely dependent on large imports of oil ($43 million worth of it, mainly diesel, for power generation this year).

Well, maybe it will go nuclear. But it is, says the Northern Territory Chief Minister, Mr Paul Everingham, a prickly political problem.

This week he is overseas on a trip sponsored by the British Government, during which he will study, among other things, different methods of power generation--solar ponds in Israel; hydroelectric generation in Austria; tidal power in France; and nuclear power generation in Britain and France.

"We must produce cheaper power," he told me in his Darwin office last week. "Once we get the railway from Alice Springs to Darwin we will be able to import coal from other States--but that will only allow us to stabilise power costs, not reduce them. Coal-powered electricity generation will be cheaper for us only if we find coal in the Territory.

"We've got plenty of uranium, of course. It's at the bottom of everyone's garden. It's a pity it's not coal.

"Nuclear generation is the obvious answer. But the political complications are a bit daunting."

He will commit himself no further than that. But unless coal is found in commercial quantities in the Top End, it seems only logical that this potential multi-billion exporter of the contentious yellowcake will itself become a consumer.

The Territory's need for cheaper power becomes painfully obvious with a bit of simple arithmetic. The budgeted import bill for oil for power generation in Darwin alone for 1980-81 is $30.7 million. This works out at $600 a head for every woman, man and child in the city--about $12 each per week, with actual generating costs still to be added...maybe $60 a week all told for a couple with two children.

The total budgets for some smaller, mainly Aboriginal, communities are swallowed up by oil bills.

But the Northern Territory is supremely confident of its ability to handle the problems of the future. The Federal Government's go-ahead for the Alice Springs-Darwin railway (dealt with in an article yesterday) has given morale a great boost--and to nobody more than to Mr Everingham.

CSO: 5100

GOVERNMENT, OPPOSITION DEBATE URANIUM SALES

Parliament on Uranium

OW280022 Melbourne Overseas Service in English 0710 GMT 27 Nov 80

[From Focus on Australia program]

[Text] Australia's Parliament is again considering the controversial questions surrounding the sale and use of the country's rich uranium supplies. The foreign minister, Mr Street, has outlined to Parliament the government's policy on the conditions under which Australia would allow other countries to reprocess its uramium. In response, the opposition Labor Party claimed that the government had clearly abdicated its responsibilities in nuclear energy matters. Political correspondent (Graham Dobell) was in Parliament for the debate:

[Begin recording] It is estimated that Australia has up to 20 percent of the world's easily recoverable uranium, and following long debate, the government gave the go-ahead 3 years ago for mining of the nuclear fuel. The Labor Party, though, maintains its opposition.

In his statement to Parliament, Mr Street said a number of important industrial countries were committed to reprocessing of uramium as part of their nuclear programs. The foreign minister said international discussions over the past 3 years had considerably narrowed differences over reprocessing, which is also necessary for the production of nuclear weapons. Mr Street said it was generally agreed that prior consent rights over such processing, a right which Australia claims over the uranium it sells, should be applied in a predictable manner. Defendine the government's decision to allow reprocessing of Australian uranium, he said this would contribute to greater certainty and stability in international nuclear trade and cooperation. Countries were less likely to launch prematurely into the acquisition of sensitive technologies if their concerns about energy security could be allayed. Thus, Mr Street said Australia was prepared to grant its consent for reprocessing which he described as a legitimate procedure consistent with the objectives of nuclear nonproliferation. The foreign minister said projections by the international nuclear fuel cycle evaluation suggested that uranium supplies might not be sufficient to meet energy requirements after the year 2000 and reprocessing would be essential for some countries.

In reply, the deputy leader of the Labor opposition, Mr Bowen, said Mr Street's statement would never have come from a Labor government. It was clear and fundamental labor policy that Australia should not mine and sell uranium until it could be safely used and there was adequate technology to dispose of high-level waste. Mr Bowen said these matters had not been solved. The deputy opposition leader claimed the government had given away its commitment to nuclear control and was now only interested in making a dollar through selling Australia's resources. If uranium was a precious fuel, he said, Australia would not suffer commercially by leaving it in the ground.

Mr Bowen said the government was going to rely on the integrity of buyer governments. He said Australia had been negotiating safeguards agreements with countries such as South Korea, the Philippines and Iran before the fall of the shah. Mr Bowen asked whether such countries could be relied on to adequately handle uranium and not to divert it to military use.

Mr Bowen said Australia was willing to sell uranium to France, which he described as having an immoral attitude to nuclear power. France, he said, wanted to sell nuclear power plants to countries such as Iraq. Mr Bowen said Australia was also willing to sell uranium to Finland, which would have the material reprocessed in the Soviet Union. [end recording]

Unions' Anti-Uranium Campaign

OW281423 Melbourne Overseas Service in English 1230 GMT 28 Nov 80

[Text] The Australian union movement is to step up its campaign to stop the mining and export of uranium. This follows the announcement by the federal government that other countries would be allowed to reprocess Australian uranium for peaceful purposes. The federal opposition spokesman on the environment, Mr West, said that the reprocessing of Australian uranium overseas would be a huge step toward the proliferation of nuclear weapons. He called on trade unions not following the policy of the Australian Council of Trade Unions in opposing the mining and export of uranium to reexamine their position.

At the time that Mr West's statement was issued, railway station staff in Queensland announced that they would reconsider their vote taken earlier this month to permit the movement of uranium for export. The president of the Australian Council of Trade Unions, Mr Dolan, said the federal government would have to have teams of scientists in every country reprocessing Australian uranium to insure that it was not being used to produce fuel for nuclear weapons.

'AUSTRALIAN' Supports Policy

OW281421 Melbourne Overseas Service in English 0720 GMT 28 Nov 80

[From Australian Editorial Opinion program]

[Text] In today's editorial, the national daily "THE AUSTRALIAN" comments on the Australian Government's announcement that it will allow some nations to reprocess spent nuclear fuel derived from Australian supplied uranium. The foreign minister, Mr Street, said importers of Australian uranium would be able to apply for permission to reprocess the end product of nuclear power generation. The paper points out that this does not mean permission will automatically be given. Buyer nations will be required to sign an agreement that the uranium will be reprocessed only for energy uses and that the approved waste management standards will be met. Mr Street also made it clear that the Australia Government would look at the stability and peaceful intent of the applicant countries before giving approval for reprocessing. This sort of security, says THE AUSTRALIAN is already applied to countries seeking to buy Australian uranium under the terms of the present agreement. However, it says, there is no way the government can guarantee that a recipient country will adhere to the terms of the agreement. The paper adds there is no way by which Australia can properly police the agreement and there is no way it can guarantee that a new government in the importing country will continue to observe the terms of the agreement.

THE AUSTRALIAN says the uranium export issue is an emotional one. It warns that the issue usually does not get the close examination it needs because of the emotionalism surrounding it. The only way Australia can ensure its uranium is not reprocessed, says the paper, is not to export it at all. But, it says, this course would be both unrealistic and wrong. There is already enough plutonium in the world to blow the globe to pieces several times, and what is more relevant, says the paper, the world needs Australian uranium for power generation. This need, says THE AUSTRALIAN will continue to grow as underdeveloped countries seek nuclear power, not to make war, but to create a better standard of living for their people. The paper says Australia cannot deny them the material to do this, and points out that nuclear power generation is a fact of life in the world.

However, THE AUSTRALIAN warns that secret uranium deals, either private or between governments, will not be countenanced by the Australian public. It calls on the government to inform the people about which nations seek to import Australian uranium, if and when they seek permission to reprocess it, and the government's decision with its reasons on granting or refusing permission.

CSO: 5100

AUSTRALIA

BRIEFS

URANIUM FOR JAPAN--Japan is worried a Labor victory will seriously set back its nuclear power program. Japanese apathy towards the Australian election changed this week as opinion polls suggested the end might be in sight for the Fraser Government, closing the gate on exports of Australian uranium. Japanese electricity companies are investing in Northern Territory uranium projects as a source of yellowcake for power generation in the 1990s. The companies fear that a Labor prohibition on uranium exports after existing contracts are filled will wreck their long-range conversion plan. Even a softened stance by the Opposition leader, Mr Hayden, earlier this week indicating that his government might review the party's policy on uranium rings hollow in Tokyo. "It's Australia's decision," one Tokyo power executive said on Friday. "We will live with whichever government comes to power in Canberra." [By Alan Goodall] [Excerpt] [Canberra THE AUSTRALIAN in English 18-19 Oct 80 p 5]

RAIL LINK FOR URANIUM--The people of the Northern Territory are ecstatic about the Fraser Government's decision to build the Alice Springs-Darwin railway. What will a north-south rail link give to the nation distinct from what it will do to make life better and easier for Territorians? Broadly, the benefits are obvious: the opening up of a vast area; the provision of an essential defence tool; the creation of new markets; and the extension of the nation's economic base. The Territory has enormous resources which a rail system would tap. They include about 25 per cent of the world's proven reserves of uranium at Nabarlek, Ranger, Jabiluka and Koongara. [Excerpts] [Canberra THE AUSTRALIAN in English 21 Oct 80 p 9]

URANIUM FINDS--Western Mining Corp has found three high grade gold areas and more encouraging copper and uranium values. In a quarterly report which consolidated the company's reputation as Australia's most successful exploration outfit, WMC reported high copper and uranium intersections at its Olympic Dam deposit in South Australia. Results of drill holes at Olympic Dam, near Roxby Downs in SA, not released in the previous quarterly report, continued to show encouraging copper and uranium assays. Drill hold RD57 proved 2.12 per cent copper over a 10m intersection while RD75 held the higherst uranium assay of 0.65 kg to the tonne and 1.43 per cent copper over 121m. [By David Koch] [Excerpts] [Canberra THE FINANCIAL AUSTRALIAN in English 22 Oct 80 p 1]

QUEENSLAND URANIUM PROSPECTING--Sturts Meadows Prospecting and Mary Kathleen Uranium (MKU) have entered into a joint venture to explore Sturts' Turpentine mining lease near Mt Isa, Queensland. MKU is to earn a 7[illegible] percent interest in the project after spending $75,000. Sturts' directors said: "If further exploration is warranted and/or if a commercial operation can be mounted, MKU...will bear the costs up to $870,000, after which contributions will be made according to ownership." As operator of the exploration program, MKU will begin field work after approvals are given and will sink four diamond drill holds. [Text] [Canberra THE FINANCIAL AUSTRALIAN in English 22 Oct 80 p 2]

CSO: 5100

GOVERNMENT CONFIRMS NUCLEAR POWER PLANS

Dacca THE BANGLADESH OBSERVER in English 6 Sep 80 pp 1, 12

[Text] The Government on Friday described the statement of former Minister for Science Technology and Natural Resources Dr. Hafiz Chowdhury regarding setting up of a nuclear plant in the country as "incredible and imaginary" reports BSS.

To remove "misgiving" created in the minds of the people by the statement the Government Press Note said that in view of the continued upward fixation of prices of petroleum and other conventional energy sources by the producing countries efforts were continuing throughout the world to find source of alternative energy at a minimum cost.

The Press Note said that one of the prime condition for the development of agriculture and industry was to ensure steady supply of power and for that the Government had taken up the project to set up the 125 megawatt nuclear power plant in the country. The speedy implementation of the project will not only meet the energy shortage but will also ensure the development of industry and economic prosperity of the country. Even efforts were being made to use solar energy as a cheap source of power the Press Note added.

The Press Note said that there was no valid reason that accidents would take place in Bangladesh as it occurred in nuclear power plant in the US. In many developed countries of the world nuclear power plants were in use and were running without accidents. Moreover, accidents were accident and for that reason the march of science could not be halted.

Adequate safety measures would be taken so that accident does not take place and radio active wastes would not be dumped in the vicinity of human habitation.

In the backdrop of ever growing population explosion, speedy industrialisation and global oil crisis, every country today was thinking about energy problem. Till now, it is the nuclear power plant that produces power at the cheapest cost and for that the developed countries of the world were very eager to set up nuclear power plants, the Press Note added.

According to Dr. Chowdhury's statement and opinion Bangladesh could not avoid dependence on others in the production of energy even in conventional way, because, like uranium, oil has not yet been found in the country, the Press Note said.

The Press Note described the apprehension of Dr. Chowdhury that plutonium produced from nuclear reactor could be used for producing Atom bomb was "absolutely grandless," because Bangladesh was a signatory to Nuclear Non-Proliferation Treaty. Bangladesh was only committed to the peaceful use of nuclear energy, the Press Note stressed.

CSO: 5100

EXPERT CALLS FOR HALT TO NARORA PROJECT

Bombay THE TIMES OF INDIA in English 26 Oct 80 p 6

[Text] Allahabad, October 26 (PTI).

A Delhi science policy expert wants the Narora atomic power project to be stopped as he think it to be a potential threat to the safety of the entire Indo-Gangetic plain. [as published]

The project on the banks of the Ganga is in a high seismic zone, only 50 km. from the active Moradabad earthquake fault, Dr. Direndra Sharma, professor of science policy at the Jawaharlal Nehru University, told the National Academy of Sciences here today.

He said any untoward nuclear accident to the atomic station "is likely to turn the fertile agricultural soil of Narora region into a deathland for thousands of years to come."

He said any spillage of radio activity into the Ganga would be disastrous as the river flows 1,000 km. into the Bay of Bengal passing though the three most populated states of Uttar Pradesh, Bihar and West Bengal. [as published]

Dr. Sharma cited the recent bombing by Iran of a nuclear project in Iraq and the levelling of an entire town in Algeria by a strong earthquake.

Even if an earthquake failed to destroy the reactor, damage could be caused by a direct hit by enemy missile leading to an accident similar to that of the Three Mile Island (TMI) reactor in the US two years ago, he said.

Although no one was harmed in the TMI accident, it had demonstrated that "an accident in a nuclear plant is a real possibility." If that happened at Narora, the Ganga would be contaminated, he warned.

Declaring that the Narora station had been set up in "total disregard to our environment", Dr. Sharma urged "immediate stoppage" of the project purely on grounds of safety.

Speaking at the academy symposium on "Alternate energy sources," Dr. Sharma questioned the wisdom of spending millions on atomic energy which would provide just

2,700 Mw. by the year 2000, while India had an untapped hydel potential of over 90,000 Mw.

He said enormous energy and money were spent to process pure water into heavy water for atomic energy (one ounce of heavy water from 15,000 ounces of pure water) while millions of Indians "suffer owing to the lack of drinking water".

Dr. Sharma said the allocation of over Rs. 77 crores for research on atomic energy--in comparison to Rs. 11 crores for petroleum and Rs. 5.7 crores for coal--did not reflect the priorities needed for optimal power production.

He said there was no reason "why we should not divert our meagre resources towards more economical and self-reliant alternate sources of energy like solar and hydel power "that are clean and harmless".

CSO: 5100

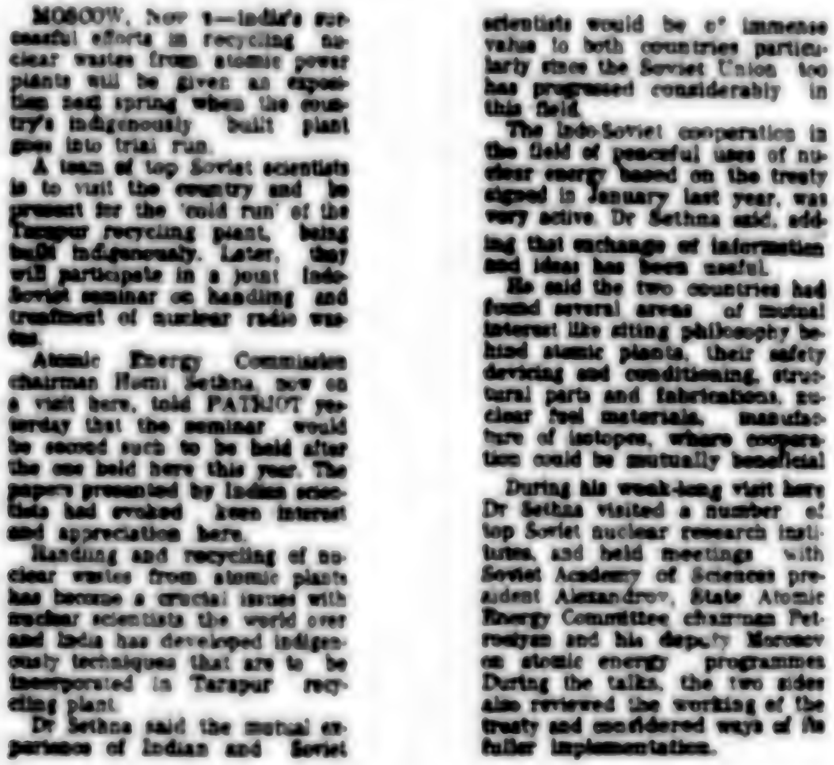
INDIA

SEMINAR ON NUCLEAR WASTE DISPOSAL PLANNED

New Delhi PATRIOT in English 2 Nov 80 p 3

[Article by Vinod Taksal: "Seminar on Recycling of Nuclear Wastes"]

[Text]



MOSCOW, Nov 1—India's successful efforts in recycling nuclear wastes from atomic power plants will be given an exposition next spring when the country's indigenously built plant goes into trial run.

A team of top Soviet scientists is to visit the country and be present for the 'cold run' of the Tarapur recycling plant, being built indigenously. Later, they will participate in a joint Indo-Soviet seminar on handling and treatment of nuclear radio wastes.

Atomic Energy Commission chairman Homi Sethna, now on a visit here, told PATRIOT yesterday that the seminar would be second such to be held after the one held here this year. The papers presented by Indian scientists had evoked keen interest and appreciation here.

Handling and recycling of nuclear wastes from atomic plants has become a crucial issues with nuclear scientists the world over and India has developed indigenously techniques that are to be incorporated in Tarapur recycling plant.

Dr Sethna said the mutual experience of Indian and Soviet scientists would be of immense value to both countries particularly since the Soviet Union too has progressed considerably in this field.

The Indo-Soviet cooperation in the field of peaceful uses of nuclear energy based on the treaty signed in January last year, was very active, Dr Sethna said, adding that exchange of information and ideas has been useful.

He said the two countries had found several areas of mutual interest like siting philosophy behind atomic plants, their safety devising and conditioning, structural parts and fabrications, nuclear fuel materials, manufacture of isotopes, where cooperation could be mutually beneficial

During his week-long visit here Dr Sethna visited a number of top Soviet nuclear research institutes, and held meetings with Soviet Academy of Sciences president Alexandrov, State Atomic Energy Committee chairman Petrosyan and his deputy Morozov on atomic energy programmes. During the talks, the two sides also reviewed the working of the treaty and considered ways of its fuller implementation.

CSO: 5100

INDIA

URANIUM DEPOSITS FOUND IN MEGHALAYA

Calcutta THE STATESMAN in English 5 Nov 80 p 7

[Text] Shillong, Nov 3--Traces of huge deposits of uranium, gold and copper have been discovered by geologists in parts of Jowai, Khasi hills and Aro hills districts of Meghalaya. Schemes have been drawn up for "scientific exploitation" of the minerals.

An extensive survey carried out by the atomic minerals division of the Department of Atomic Energy has indicated the possibility of finding huge uranium deposits in Meghalaya. Uranium mineralization has been noticed in the Khasi Jaintia hills and Garo hills area of the State, while other areas are being explored by the Geological survey of India which has also stepped up its operation in the north-eastern region. The area under survey covers 2,500,000 sq. km. nearly 20% of the area of the region comprising the five States and two Union Territories.

According to present estimates there are 265 million tonnes of limestone in Arunachal Pradesh and large quantities of iron-chromium nickel ore in an 88-km belt at Kiphire in Nagaland. The region holds promise of an annual supply of four million tons of raw material for the country's special steel and alloy industries.

The GSI is conducting its search in a big way for base metals in Arunachal Pradesh where promising results had already been obtained.

A major constraint is lack of communication in the rugged terrain of the hill areas. The North Eastern Council is however, seized of this problem and has drawn up schemes to link deposit areas spread out in Nagaland, Assam, Meghalaya, and Arunachal Pradesh.

CSO: 5100

COUNTRY NEARING NUCLEAR POWER SELF-SUFFICIENCY

BK241421 Delhi NATIONAL HERALD in English 18 Nov 80 p 2

[Text] New Delhi, 16 Nov (UNI)--India has almost reached the stage of self-sufficiency in setting up nuclear power plants. Over the years the country has progressively reduced the import component of nuclear power projects. The import component of the first unit of the Rajasthan atomic power station was 45 percent which was reduced, in the case of the second unit, to 30 percent. The import component has declined further in the two nuclear power plants under construction--about 12 percent in the Madras atomic power station and 9 percent in the Narora plant in Uttar Pradesh.

Even this marginal import will be eliminated once the new manufacturing plants being set up in the country start operation. Increasing capability in design and manufacturing has also helped India to reduce indirect costs of engineering, field management and commissioning, which usually form a substantial part of a turnkey project. For instance, India was able to redure the cost of engineering, as a percentage of cost of per kilowatt installed, from 15 percent for the first unit of the Rajasthan station to less than 6 percent for the Narora plant.

The Rajasthan station is the country's second atomic power station, the first one being in Tarapur near Bombay, which was built with foreign assistance. The Tarapur plant, based on enriched uranium as fuel, consisted of two boiling-water reactors (BWR), each of about 200 MW capacity. It went into operation in 1969.

The Rajasthan plant also consisted of two units of 220 MW each reactors based on heavy water technology,; both the units are under operation now.

The third atomic power station, consisting of two heavy-water reactor units of 235 MW each, the first of which is expected to become critical by the end of this year is being built near Madras.

The fourth power station at Narora also consists of two 235 MW heavy water reactors. These reactors have several new design features and concepts including earthquake resistant design of the building and reactor components.

To meet the heavy water requirements of the atomic power stations, there are already five heavy water plants in production. Two more heavy water plants will be set up soon. The government also plans to put up five more heavy water units during the sixth plan period.

India's nuclear fuel cycle strategy has passed through three phases wit. the installation of natural uranium reactors in the first phase, followed by fast breeder reactors in the second (using plutonium from the first generation reactors with uranium-238 or thorium in the blanket), followed in the third phase by reactors based on self-sustaining thorium-uranium-233 cycle.

India is one of the few countries at present to continue with the development of natural uranium-fuelled reactors. The main reason for this has been the desire to have a reactor system that can be operated using indigenous resources.

The role of nuclear power, which provides an alternative and long-lasting source of electricity, supplementing thermal power and hydropower stations, is expected to be enlarged with the installation of more first generation pressurised heavy water reactors and with a breakthrough in the fast breeder reactors.

CSO: 5100

BRIEFS

U.S. FUEL DELIVERY--India has informed the United States that she will not accept continuing delays and uncertainties in supplies of fuel for Tarapur atomic powerplant, nor any conditions outside the cooperation agreement of 1963. This information was given by Minister of State for Science and Technology C.P.N. Singh in the upper house of Parliament today. He said the United States has been requested to clear the second overdue consignment of 19.8 tons of the enriched uranium for shipment without any further delay. [Text] [BK271021 Delhi General Overseas Service in English 1000 GMT 27 Nov 80]

RAJASTHAN ATOMIC STATION--Jaipur, Oct. 26. The first unit of the Rajasthan Atomic Power Project, near Kota, resumed power generation on Friday. It was closed down on October 11, following leakage in one of the oil valves. According to a spokesman of the Rajasthan State Electricity Board, the first unit of the RAPP was initially producing 50 MW of power. Generation would be increased gradually he added. The closure of the unit had caused a deficit of 40 lakh units. The leakage, according to reports reaching here, was of a minor nature.--PTI. [Text] [Madras THE HINDU in English 27 Oct 80 p 9]

CSO: 5100

PEOPLE'S REPUBLIC OF CHINA

BRIEFS

NUCLEAR FUSION PROGRAM URGED--Beijing, 1 Dec (XINHUA)--Chinese nuclear scientists today urged the government to include the study of controlled nuclear fusion in the national energy research program. More than 70 nuclear scientists from different parts of the country met here from November 26 to December 1 to discuss the subject. Controlled nuclear fusion--hydrogen fusion harnessed to produce electric power--is one of the most sophisticated technological challenges for scientists throughtout the world. China started research work on controlled nuclear fusion in 1958. The country has since built a number of experimental fusion installations. Nuclear scientists attending the latest meeting called for strengthening research work on plasma physics in the coming decade and building a number of small and medium-sized fusion installations. A special group for the study of controlled nuclear fusion was set up at the meeting with nuclear scientist Wang Ganchang at its head. It will work under the direct leadership of the State Scientific and Technological Commission. [Text] [OW011230 Beijing XINHUA in English 1215 GMT 1 Dec 80]

CSO: 5100

BRIEFS

CEMA ATOMIC REACTOR WORK--Moscow, 21 Nov, TASS--The 39th session of the CEMA Permanent Commission for Cooperation in the Field of Utilization of Atomic Energy for Peaceful Purposes was held in Protvino settlement near Moscow--the scientific centre of the Soviet Institute of High-Energy Physics. The scientists and specialists of socialist countries discussed the results of the recent research and development on major directions of atomic science and technology and coordinated plans for the coming years. It was decided, in particular, to jointly continue the work to create a thermonuclear reactor of Tokamac type. In addition to the existing agreement with Czechoslovakia, treaties with Hungary and Bulgaria were signed at the meeting. The participants in the session regarded with great interest the work which is being started on the basis [as received] of the Institute of High-Energy Physics to build the world's major accelerating-and-accumulating complex with an energy of 3 billion electron volts. That huge instrument will allow the conduct of superfine experiments in the field of high-energy physics. Consultations on CEMA countries' possible participation in the creation of the accelerator were held at the commission's meeting. [Text] [LD220044 Moscow TASS in English 1955 GMT 21 Nov 80]

CSO: 5100

CLOSURE OF A-1 NUCLEAR POWERPLANT ACKNOWLEDGED

AU241410 [Editorial Report] Under the headline "The First Year of the Atomic Age and What Next," Prague LIDOVA DEMOKRACIE in Czech on 22 November 1980 carries an article by M. Durisinova, describing the author's visit to Jaslovske Bohunice, the site of the first Czechoslovak nuclear powerplant.

Durisinova notes in her article that the first atomic power station built in Jaslovske Bohunice, called the A-1, "has in the meantime done its service." According to the author, the A-1 "was built, in fact, as a test plant, to test one of the possible technological methods of obtaining atomic power. [paragraph continues]

"Research in the world has, however, confirmed that the method based on the principle of the so-called heavy water reactor does not offer the potential of broader, more effective use, and the majority of states have, therefore, abandoned the use and the construction of heavy water reactors (Canada, for instance, has been one of the few exceptions). The so-called light water reactors which are now being built and are operating in the Soviet Union, the United States and other countries have turned out to have much better prospects (also in our country)."

Durisinova mentions in that context that "the A-1 no longer generates electricity but it continues to serve scientific purposes. There are still quite a few pending questions connected with the industrial use of atomic energy; a not unimportant question, for instance, is the solution of the problem of what to do with the equipment of the atomic powerplant when it was done its service--and every electric powerplant must suspend its operation after some time. Our A-1 offers the best conditions for such research because the experts there can deal with all the problems, for example those concerning decontamination, directly in a real facility and not merely with the aid of models in laboratories."

The article goes on to discuss the operation of the first two blocs of the V-1 powerplant in Jaslovske Bohunice, noting that "between 10 and 31 July the operation of the first bloc was halted because it was necessary to exchange one-third of the 112 fuel rods" as part of a cyclical exchange. In spite of that interruption, the V-1 powerplant fulfilled its annual production electricity plan of 3.3 million megawatt hours by 13 October, and will exceed the plan by 1 billion kilowatt hours by the end of the year, the paper points out.

In the concluding part of her article Durisinova discusses the construction of the V-2 nuclear powerplant in Jaslovske Bohunice, the construction site of which she inspected during her visit. She reports that "orginally that powerplant was to be an exact copy of its first-born sister" but adds that "there has been a change in the project." Even though the outward appearance of the V-2 will be "almost completely the same" as that of its predecessor, as Durisinova says, "in reality it will have a completely different type of reactor (reactor T-230, instead of the T-213 reactors operating in the V-1); a different, so-called 'barbotage' [barbotazni] system of security protection and a number of other technical details will also be different." The change in the project has caused a delay of "3 to 5 months," but the builders and the investors believe that they will put the first bloc of the V-2 nuclear powerplant on stream by 31 December 1982, as planned.

CSO: 5100

BRAZIL APPROVES NUCLEAR ACCORD WITH ARGENTINA

PY030007 Brasilia Domestic Service in Portuguese 2200 GMT 2 Dec 80

[From the Congressional Report--Chamber of Deputies]

[Text] The text of the Argentine-Brazilian cooperation agreement for the development and application of nuclear energy for peaceful purposes, which was signed in Buenos Aires in May 1980, has been approved. The voting was: 163 ayes, 99 nays and 1 abstention.

The Popular Party, through its deputy leader Walber Guimaraes, supported the agreement and acknowledged its political significance, but it stressed that this is a specific position and that it must not be interpreted as support for the Brazilian nuclear project.

Osvaldo Macedo, deputy leader of the Brazilian Democratic Mobilization Party [PMDB], in speaking for his party, rejected the agreement because it is antieconomic, taking into account that Brazil's energy resources are not yet exhausted.

The defense of the agreement was made by the deputy leader of the Social Democratic Party, Bonifacio de Andrade, and by Deputy Vasco Netto, who deplored the PMDB's position, stressing that all developed nations and those that are in the developing stage aspire to the improved use of nuclear energy.

CSO: 5100

INTER-AMERICAN AFFAIRS

BRIEFS

CHILE, URUGUAY NUCLEAR AGREEMENT--Chile and Uruguay have signed a cooperation agreement for the peaceful use of nuclear energy. The two countries agreed to help each other in all aspects of nuclear energy for peaceful uses. The cooperation will be carried out through the exchange of personnel and nuclear materials and equipment. The Atomic Energy Commissions of the two countries will be in charge of putting this agreement into practice. The commissions will meet at the request of either party to evaluate the projects. The agreement will be in effect 30 hours after [words indistinct] are ratified by Chile and Uruguay. [Text] [PY280147 Santiago Chile Domestic Service in Spanish 2300 GMT 27 Nov 80]

CSO: 5100

DILEMMAS SURROUNDING DIRECTION OF NUCLEAR PROGRAM EXAMINED

Sao Paulo EXAME in Portuguese 5 Nov 80 pp 61-62, 64

[Text] While the government puts an end to some differences, the opinion of the specialists converge on one point: more pragmatism.

In the midst of the controversies generated by the Brazilian nuclear program, the government recently decided to attack some management impasses head-on, offering a formal solution to the snags that arose in the constructon of Angra II and III. At Itaorna Beach, both Furnas, the future operator of the plants and the company that paid the bills, and the NUCLEBRAS Engineering Corporation (NUCLEN)--an engineering company to which Kraftwerke Union, the equipment supplier, belongs--were in charge at the same time. Even more serious duplication began to be observed in the general command of the country's energy policy as the need to contain basic investments provoked a dispute between the "dam men" and the "nucleocrats" for the ever-dwindling funds in the investment budgets.

In naming General Costa Cavalcanti, president of Itaipu Binational, to also head the Brazilian Electric Power Corporation (ELETROBRAS), the holding company that centralizes the funds in the electric energy generation area and which distributes them, the government demonstrated that the desired unity would have to be achieved under the aegis of the most classic and firmest concept of the "dam men." But by approving immediately afterwards the creation of a new Brazilian Nuclear Corporation (NUCLEBRAS) subsidiary, the same government demonstrated that predominance of the "dam men" does not by any means mean abandonment of the nuclear program.

Management

With the creation of NUCLON, the government plans to institute a new model of management in the building of power plants that will at the same time preserve the interest of the future operator, which will have stock participation in NUCLON, and the need to accumulate know-how, while maintaining the management nucleus--NUCLON will move from one building project to another. Licinio Seabra, the president of Furnas had already anticipated that type of solution in the statement he gave EXAME that is published below.

There are other dilemmas created by the nuclear program which the government has not yet been able to resovle. Perhaps the most difficult is the one raised by Frederico

Magalhaes Gomes in the discussion that follows. According to him, the demand for energy is growing too rapidly and the rates are too low. Therefore, the sector cannot afford the luxury of investing in reactors, which require a heavy investment and have a very delayed return. In that context, the option left to the government would be reduction of the rate of implementation of the nuclear program.

But that creates a third dilemma: the increase of the costs of the nuclear program itself--its social costs, so to speak--because the program was conceived to continue without interruption. What to do with the fuel element factory (which is already of an uneconomical scale) and the reactor factor if reactors are not built?

Atomic Waste

However, there are other questions to attack, such as the environmental risks or the problem of "atomic waste"; thus far, they do not represent a central concern of the specialists within and outside the government. The criticism directed at the program ("the jet-nozzle is not going to work"; "there is sufficient hydroelectric Potential"; "we are not going to assimilate all the technology that we should") would sound strange to a traveler who suddenly arrived in Angra, coming, for example, from Holland, where for months a whole community has been protesting against a nuclear plant simply out of fear of genetic damage. But for the common man, nuclear energy is a specter that awakens when reports are received about accidents in the developed countries.

However, there are no established truths with regard to the risks of nuclear plants. As a matter of fact, a great debate is going on throughout the world and being carried on at the highest scientific level, seeking to clarify if the risks of nuclear accidents are great or small. Despite the differences, it can be said that the prevailing position is that the risks are small for the majority of accidents that can befall a reactor--the most serious is the explosion of the reactor, spreading radioactive mateiral (it is never the case of a nuclear explosion because that cannot occur in a reactor). The big problem is that of waste, of the refuse, residue, subproducts and other material of various degrees of radioactivity produced by the generation of nuclear energy.

A Shallow Pit

For 30 years, the nuclear industry throughout the world has kept those various forms of waste in provisional dumps (buried in shallow pits and sometimes even in the open air) with results that the supporters of nuclear energy present as proof that there are no major problems with regard to waste. And only now is the U.S. Government, for example, beginning to try "federal solutions" for that waste. According to Julius Rosenthal, responsible for the study of the problem in the National Nuclear Energy Commission (CNEN), Angra-I will produce 150 to 250 drums per month of low-level radioactive waste. And the CNEN still does not know what to do with that waste (the drums will be provisionally kept in a quarry in Itaorna Beach itself).

For the time being, however, it is the program itself, its implementation, its timetables, objectives and funds that demand the principal attention. It is in that context that the statements that follow are formulated.

"It Is Not up to NUCLEBRAS To Propose an Energy Profile for the Country"

Paulo Nogueira Batista, president of NUCLEBRAS:

"More than the economy to be achieved by the graduated establishment of nuclear energy in Brazil, what weighs in its favor is its technically indisputable need after the hydroelectric potential has been exhausted. The objective of the Brazilian nuclear program, in its first phase, is to assimilate technology, install a nuclear industry and complement hydroelectric energy, because in order to produce large quantities of energy, the second option after hydroelectricity is nuclear energy.

"It is not up to NUCLEBRAS to propose an energy profile for the country. NUCLEBRAS was established to enable Brazil to master nuclear technology and install a nuclear industry, having in mind the utilization of that form of energy for peaceful purposes. The nuclear industry that is being established is dimensioned to take care of the country's minimum needs in that sector. We are not planning to replace hydroelectric energy with nuclear energy. With the construction of the eight plants envisaged in the Brazilian-German agreement, the country is preparing itself to progressively produce the electric energy necessary to complement hydroelectric energy, having in mind the growth of demand. The increase of the nuclear contribution, therefore, cannot be conditioned on the presetting of dates. It will be a graduated contribution, like a relay race."

"If the Process Does Not Continue, It Will Not Be Consolidated"

Ney Ferreira de Oliveira Junior, director of NUCLEBRAS:

Basic reactor engineering know-how consists essentially of the transfer of documentation and its updating until the completion of the agreement, in charge of NUCLEN. The detailing projects go to private companies but the detailing of the strictly nuclear area always remains with NUCLEN. That process of transferring basic project engineering will be completed by the fourth plant. But if there is no continuity, the process might not be consolidated."

"Nuclear Energy, Yes, But Not at That Price"

Dirceu Cardoso, senator, member of the senate investigating committee on nuclear energy:

"We have to make way for nuclear energy. All members of the senate investigating committee hold that point of view, in favor of Brazil reaching that nuclear level. Analyzing the inordinate effort, I have been gradually reaching the conviction that Brazil is anxious to reach the ranking of a nuclear power including the bomb. I am personally in favor of the bomb.

"We are introducing the nuclear age in Brazil and we have to pay for that, but not that price. Twenty billion cruzeiros at 1980 prices will be spent on the piles alone. We have information that 12 billion has already been spent and we no longer believe in the information we get from them; there is general disbelief. I believe that the program should stop with Angra-III and other other members of the committee feel the same way I do about this."

"The Unity of the Government Around the Program Was Consolidated"

Sebastiao Valadao, superintendent of NUCLEBRAS:

"Many people within and outside the government became alarmed over the criticism and as soon as President Joao Figueiredo assumed power a reevaluation was made. That process of reevaluation was not formal or explicit but it occurred during a given period, the conclusion being the continuity of the program, its confirmation. The criticism and the consequent reevaluation consolidated the unity of the government around the program. Formally, the date for the conclusion of the program was postponed to 1985."

"We Cannot Oppose the Use of Nuclear Energy Per Se"

Severo Gomes, former minister of industry and commerce:

"There is a certain radicalization and even obscurantism in the opposition to the use of nuclear energy per se. It is like the cliche that if we cut down the trees in the Amazon the whole thing will become a desert and, therefore, the Amazon should be untouchable. I do not believe one can be purely and simply opposed to nuclear energy. But I also cannot see how the government can continue within the framework of the nuclear program because the world cannot operate on the basis of future projections of statistical series made at the time of the Brazilian miracle."

"The Important Thing Is To Know First if the Jet-Nozzle Is Going To Work"

General Dirceu Coutinho, former director of the NUCLEBRAS Isotopic Enrichment Corporation (NUCLEI):

"Only 6 months after the first stage of the uranium enrichment demonstration plant goes into operation--a stage that does not enrich commercial quantities--in 1982-83, will it be decided whether to proceed with the enormous investments necessary for the rest of the plant. And, at that time, we may be at square zero in terms of enrichment. Since the work is at a semistandstill, I suppose they are postponing that conclusion. For that reason, I believe that the important thing is to give priority to the jet-nozzle method cascade to know immediately whether it works or not; and only after we know that, to decide on the rest of the program."

"Things Cannot Continue That Way. Furnas Pays the Bills but Is Not in Charge"

Licinio Seabra, of Furnas Electric Power Company:

"We started from the idea that NUCLEBRAS would direct the program and NUCLEN would build and turn over the plants to the operating companies. That idea is based on a number of arguments that I consider fallacious. That way, Furnas pays the bills but is not in charge. In most countries, it is the concessionaire power company that controls operations. In our case, since KWU is a partner of NUCLEN's, we ended up having KWU selling to itself. It is the one who pays the bills that should have responsibility for the project. Today after 4 years of that experience, I do not believe it can continue that way. NUCLEN should keep only the strictly nuclear part."

"We Should Forego the Option of Purchasing Two More Reactors"

Jose Goldenberg, physicist, professor at the University of Sao Paulo:

"I would not reopen the discussion of the basic choice of the type of reactor because that is superseded, but I would limit the program to three reactors, which I consider with the nuclear cooperation agreement with Germany, and it does not violate commercial contracts. I consider incorrect the assertion that Brazil has signed commercial commitments in addition to the two purchases already made, and an option to purchase two more reactors, which we can forego. We should also review the position that insists that eight reactors are necessary for the transfer of technology."

"We Cannot Conduct the Nuclear Program at That Pace"

Itamar Franco, senator, member of the senate investigating committee on nuclear energy:

"Perhaps the principal objective of the program might have been to supply energy but today the situation is different. The cost per kilowatt initially envisaged was $500 and today it is in the order of $3,000. The delays increase the cost; the internal conflicts increase the cost. A country lacking funds to be applied in other areas cannot conduct the nuclear program at that pace."

"Condition the Program on the Energy Needs"

Airton Bassani, director of CONFAB:

"Even though I am connected with the program, I believe its pace should be conditioned on energy priorities and, of course, the need to assimilate technology without a continuity solution. It is necessary that we feel that the energy priorities are being correctly evaluated. I believe the priority ascribed to the program at the time it was signed in terms of energy is no longer justified and I believe it is essential now that the program be adapted to the need to prepare us for the turn of the century.

"I changed my ideas about nuclear energy, ideas that were conditioned by national and international situations that changed. The agreement was signed in 1975 when the construction of 50 plants was being completed in the United States. Today that is not happening any more."

"In NUCLEP, We Are Going To End Up Exporting Components"

Alfredo do Amaral Osorio, director-superintendent of NUCLEP:

"If the government cuts the program in half, everything will change. At the present time, with the extension of the period between the beginning of one plant and the start of another, from 12 to 15 months, NUCLEP was left with an idle capacity in the order of 30 percent. I have a feeling that we will end up exporting heavy reactor components to Germany itself. We even have an order for Argentina already."

"In the Short Term, We Have To Invest the Maximum in Hydroelectric Plants"

Frederico Birchal de Magalhaes Gomes, of ELECTROBRAS:

"In addition to all the other reasons, there are very important financial reasons militating against the input of nuclear energy into the electricity network in the near future. The demand continues to grow at a high rate but the electricity rates are low, below the permissible legal level, which has reduced the sector's self-financing capability. With the cost levels and maturation terms of nuclear energy, we could resolve the problem in the year 2000, but in the short term we would be virtually without energy if we do not invest the maximum possible in hydroelectric plants. We can permit the construction of a certain number of power plants but they should not be touched before Angra-I is completed."

"If There Are Delays in Angra, We Can Supply Germany"

Mauricio Valim do Val, superintendent of the fuel element factory:

"If there are delays in the original date for the commercial production of energy by Angra-I, envisaged for the end of 1981 or early 1982, there will be problems for the fuel factory. One solution would be to manufacture fuel elements for third parties, Perhaps even for Germany, whose factory, which is very antiquated, will have to shut down for some time to be refitted."

"I Always Believed That More Energy Was More Happiness but I Changed"

David Simon, former director-superintendent of NUCLEN:

"We have to think of energy in the most general terms. Energy for whom? Energy for what? In the time of Juscelino, we had the shameful per capita consumption rate of 150 KWH per annum. Today it is 900, almost 1,000. But the other rates, illiteracy, infant mortality, continue to be shameful. For that reason, I changed my way of thinking. I changed very recently because I always believed that more energy was more happiness. If we proceed with that program, Brazil will be left with its pants in its hands for 15 years. That is why I believe that the economic difficulties are going to resolve the problem that politics could not."

"I Still Support the Natural Uranium Line"

Luis Pinguelli Rosa, physicist, professor at the Federal University of Rio de Janeiro:

"The government began to divide more and more until Delfim alined himself against the program. Today the most dynamic sector of the government is against the nuclear program. A more modest program and with firmer stages would permit greater control, the assimilation of technology and complete independence--a program, for example, based on the natural uranium line, which I still support. Brazil could do that because it has lag time."

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BRIEFS

URANIUM DISCOVERY--President Anwar Al-Sadat has received important news from the Nuclear Materials Board about the discovery of large quantities of uranium in the Egyptian mines in Wadi 'Atallah in the Eastern Desert. Dr Al-Shadhili Muhammad al-Shadhili, head of the Nuclear Materials Board, decided to pay 5,000 pounds reward to the mine workers. The board has agreed with a Canadian establishment on building a plant to enrich the uranium ore. Blueprints of the plant have actually been received. The board also contracted the purchase of a plan for the extraction of nuclear material (such as zircon and monazite) in Rashid. Geologist 'Atif Rabi', head of Mechanical Drilling Department, told ROSE AL-YUSUF with enthusiasm that we need to carry out exploration over 100 [square] km and not just 10 km, because the results of the discovery are promising. 'Abbas Mahmud, president of the General Union of Mines and Quarries Workers, has affirmed to us that the Nuclear Materials Board was anxious to involve the union in cosigning the contract establishing the mines. [Text] [LD261127 Cairo ROSE AL-YUSUF in Arabic 24 Nov 80 p 3]

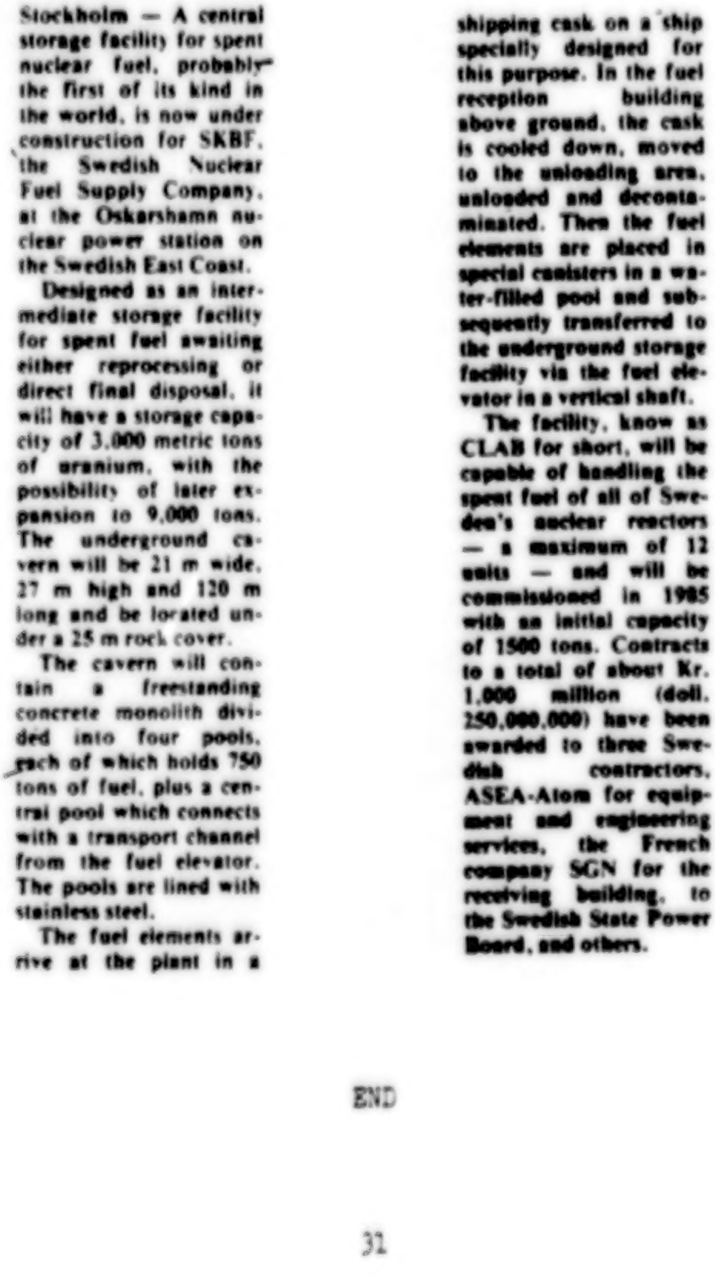
CSO: 5100

SWEDEN

NEW TYPE SPENT NUCLEAR FUEL STORAGE FACILITY BEING BUILT

Oslo NORWEGIAN JOURNAL OF SHIPPING AND COMMERCE in English 14 Nov 80 p 35

[Text]



Stockholm — A central storage facility for spent nuclear fuel, probably the first of its kind in the world, is now under construction for SKBF, the Swedish Nuclear Fuel Supply Company, at the Oskarshamn nuclear power station on the Swedish East Coast.

Designed as an intermediate storage facility for spent fuel awaiting either reprocessing or direct final disposal, it will have a storage capacity of 3,000 metric tons of uranium, with the possibility of later expansion to 9,000 tons. The underground cavern will be 21 m wide, 27 m high and 120 m long and be located under a 25 m rock cover.

The cavern will contain a freestanding concrete monolith divided into four pools, each of which holds 750 tons of fuel, plus a central pool which connects with a transport channel from the fuel elevator. The pools are lined with stainless steel.

The fuel elements arrive at the plant in a shipping cask on a ship specially designed for this purpose. In the fuel reception building above ground, the cask is cooled down, moved to the unloading area, unloaded and decontaminated. Then the fuel elements are placed in special canisters in a water-filled pool and subsequently transferred to the underground storage facility via the fuel elevator in a vertical shaft.

The facility, know as CLAB for short, will be capable of handling the spent fuel of all of Sweden's nuclear reactors — a maximum of 12 units — and will be commissioned in 1985 with an initial capacity of 1500 tons. Contracts to a total of about Kr. 1,000 million (doll. 250,000,000) have been awarded to three Swedish contractors, ASEA-Atom for equipment and engineering services, the French company SGN for the receiving building, to the Swedish State Power Board, and others.

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